Trigonometry Workbook

Six circular functions

krista king MATH

DOMAIN AND RANGE OF THE SIX CIRCULAR FUNCTIONS

■ 1. Find the domain of $f(x)$.

$$f(x) = \sqrt{\sin x}$$

■ 2. Find the domain of $f(x)$.

$$f(x) = \frac{2\tan x - 3\cot x}{2 - \sin 3x}$$

■ 3. Find the range of $f(x)$.

$$f(x) = 3\sec 2x - 1$$

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FIND THE VALUE OR SAY WHERE IT'S UNDEFINED

1. Evaluate the expression.

$$2\csc\frac{49\pi}{6}-3\cos\frac{13\pi}{3}+\tan\frac{25\pi}{4}$$

2. Find the angle $\theta \in [0,2\pi)$.

$$\sin\theta=\frac{1}{2} \text{ and } \cos\theta=-\frac{\sqrt{3}}{2}$$

3. Find the angle θ in the fourth quadrant.

$$\csc\theta=-2$$

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FIND ALL SIX TRIG FUNCTIONS GIVEN THE QUADRANT OF THE ANGLE

1. Evaluate the expression if $\cos\theta = 1/\sqrt{3}$.

$$\tan^2\theta + \sin^2\theta + \sec^2\theta$$

2. Find $\cot\theta$ if $\cos\theta = 0.6$ and $\theta \in [5\pi, 6\pi]$.

3. Find $\sin\theta$ if $\sec\theta = 3$ and $\cot\theta < 0$.

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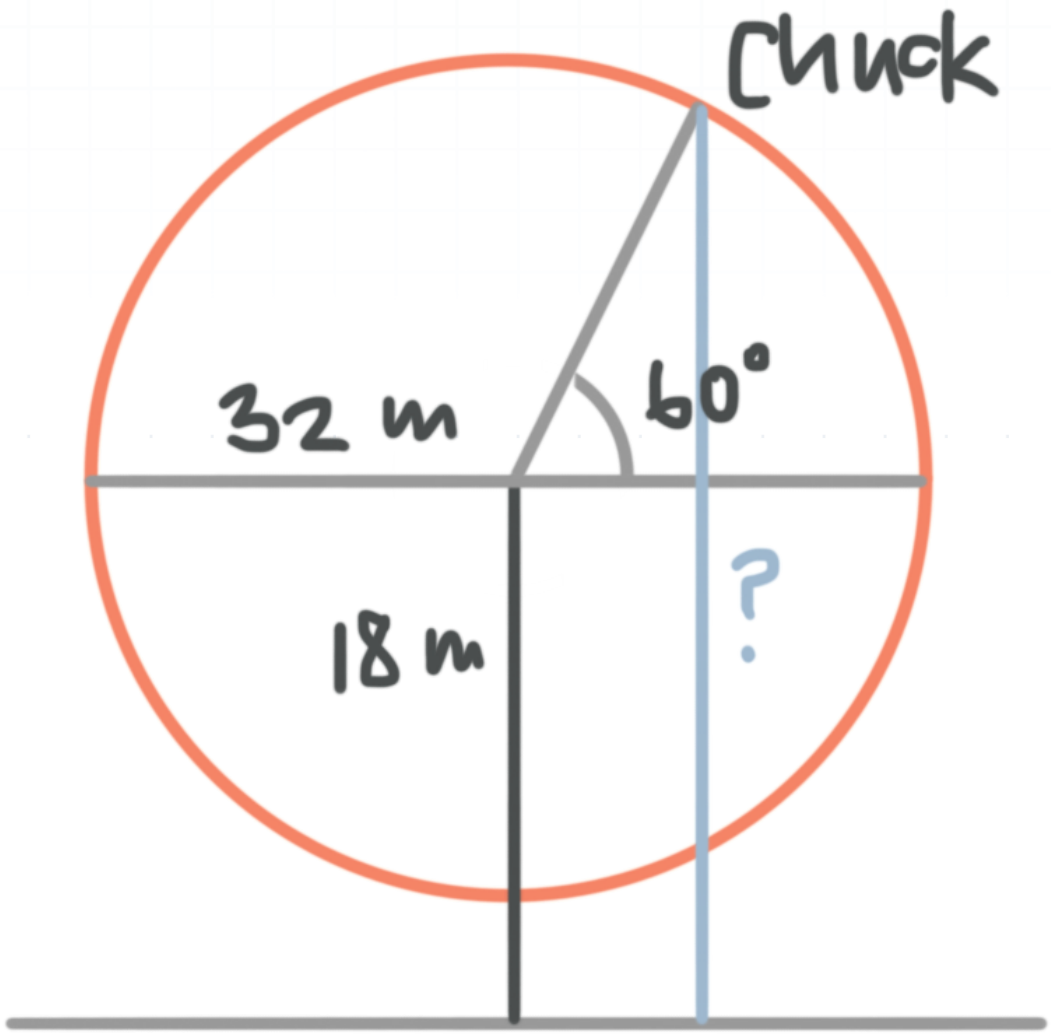
ANGLE OF ELEVATION

■ 1. Find $\cos\theta$, where θ is the angle of elevation of the point $(2,3)$ with respect to the point $(-1,-1)$.

■ 2. Chuck rides a ferris wheel at a carnival. Find the distance from Chuck to the ground (rounded to the nearest meter), if the center of the wheel is 18 m from the ground, the diameter of the wheel is 32 m, and that the angle of elevation of Chuck with respect to the center of the wheel is $60°$.



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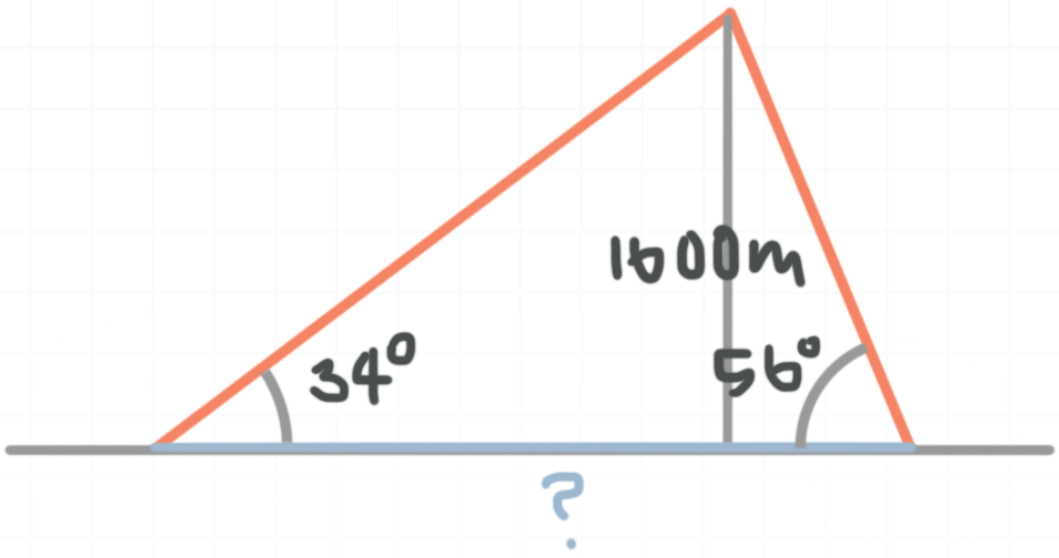
3. A company considers building a tunnel through a mountain. The height of the mountain is $1{,}600$ m above the ground, and the angles of elevation of the peak with respect to the left and right endpoints of the tunnel are $34°$ and $56°$ respectively. Find the length of the tunnel to the nearest meter.



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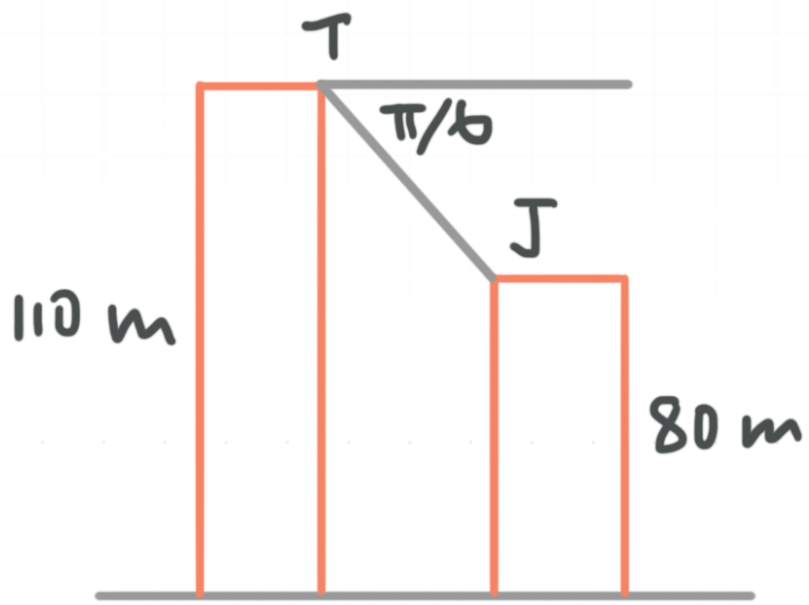
ANGLE OF DEPRESSION

■ 1. Find $\sin\theta$, where θ is the angle of depression of the point $(3, -4)$ with respect to origin.

■ 2. Tom stands on the roof of a 110 m high building, and he looks down at Jerry, who's standing on the roof of a neighboring 80 m high building. The angle of depression of Jerry with respect to Tom is $\pi/6$ radians. Find the distance between the houses to the nearest meter.



■ 3. Donald stands on the roof of a building, and he can see his friends Mickey and Goofy standing on different floors of a neighboring building. The angle of depression of Mickey with respect to Donald is $\pi/6$ radians. The angle of elevation of Goofy with respect to Donald is $\pi/4$ radians. Find the distance between Mickey and Goofy to the nearest tenth of a meter, if the distance between the buildings is 60 m.

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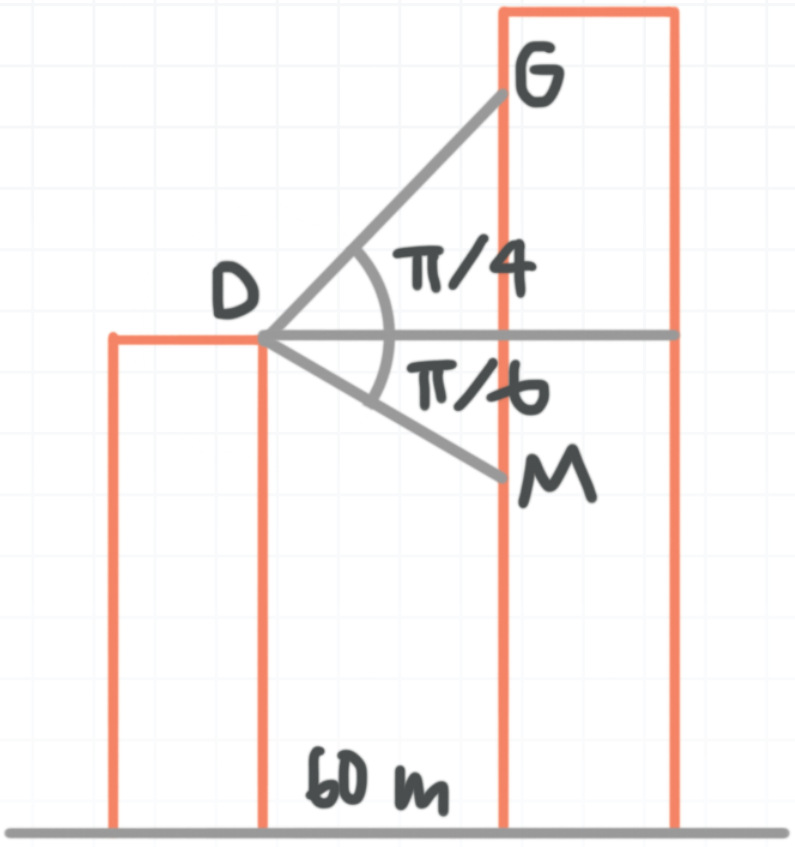

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PROVING THE TRIG EQUATION

1. Prove that the product of all six circular functions is equal to 1 for any angle θ lying within their domains.

$$\sin\theta \cdot \cos\theta \cdot \tan\theta \cdot \cot\theta \cdot \sec\theta \cdot \csc\theta = 1$$

2. Prove the identity.

$$\cos^4\theta - \sin^4\theta = (\cos\theta + \sin\theta)(\cos\theta - \sin\theta)$$

3. Prove the identity.

$$\frac{1 + \tan\theta}{1 + \cot\theta} = \tan\theta$$

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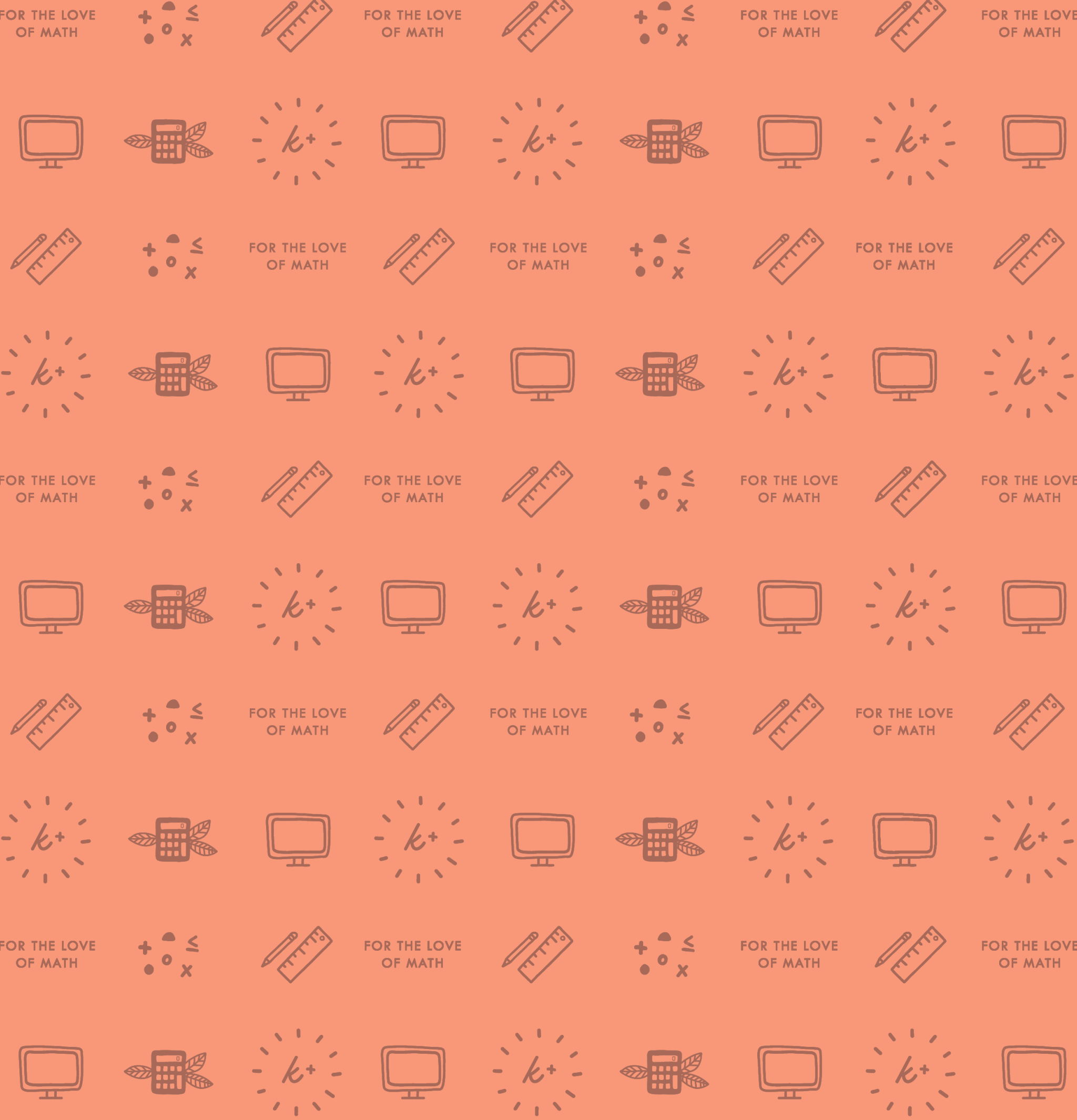

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